CLAIMS

1. A diffractive optical element of the binary type comprising one or more optical zones, one zone comprising binary microstructures with a variable fill factor etched on the surface of an optical material having a given index (n), forming an artificial material with effective index variation whose effective index

5 varies between a minimum value and a maximum value of said element, characterized in that one optical zone of said element forms a composite artificial material comprising, in a first portion, microstructures (m_1) according to a first geometry for which the effective index decreases with the fill factor and, in a second portion, microstructures (m_2) according to a second geometry for

10 which the effective index increases with the fill factor, and in that the fill factors of said microstructures (m_1, m_2) according to the first and second geometries are defined as a function of the dispersion of said material with the wavelength in the first portion and the second portion, so as to obtain an element blazed over a wide spectral band.

15

2. The optical element as claimed in claim 1, characterized in that the minimum and maximum effective indices of said composite material are determined from curves of variation in the effective index with the fill factor of the microstructures, which are obtained at the design wavelength and at a

20 wavelength λ_∞ which is large compared with the design wavelength λ_0, so as to obtain an optimum value strictly greater than 0 for a characterization parameter α of said optical zone, said parameter being given by the equation:

$$\alpha = \frac{\left(\delta n_{min} - \delta n_{max}\right)}{\Delta n(\lambda_0)}, \quad \text{where} \quad \Delta n(\lambda_0) = n_{max}(\lambda_0) - n_{min}(\lambda_0), \quad \delta n_{min} = n_{min}(\lambda_0) - n_{min}(\lambda_\infty)$$

and $\delta n_{max} = n_{max}(\lambda_0) - n_{max}(\lambda_\infty)$, where n_{max} and n_{min} are respectively the values

25 of the maximum and minimum effective index at the wavelength in question.

3. The optical element as claimed in claim 1 or 2, characterized in that it comprises one or more zones formed only by microstructures according to either the first or second geometry.

4.   The optical element as claimed in one of the preceding claims, characterized in that the microstructures of the first geometry type are of the hole type, and the microstructures of the second geometry type are of the pillar type.

5.   The optical element as claimed in one of the preceding claims, characterized in that the optical material has a high refractive index (n).

6.   The optical element as claimed in any one of the preceding claims, corresponding to a binary synthesis of an échelette grating having a determined period Λ, characterized in that each optical zone of the microstructure corresponds to an echelon (e) of the échelette grating.

7.   The optical element as claimed in any one of claims 1 to 5, characterized in that each optical zone of said element corresponds to a zone (z1) of a Fresnel lens.

8.   The optical element as claimed in the preceding claim, characterized in that the optical zone is defined to have $0.3 \leq \alpha \leq 0.5$.

9.   An optical system for use in imaging with a wide spectral band or in a dual spectral band, comprising a diffractive optical element as claimed in any one of the preceding claims 1 to 8.

10. The optical system as claimed in claim 9, for infrared imaging.

11. The optical system as claimed in claim 9, for imaging in the visible range.